

ciples of evidence and reasoning which held good of the language and history of Greece or Rome must hold equally good of the language and history of the ancient Jews.

The lectures he has now published under the heading of "The Old Testament in the Jewish Church," put in a popular and intelligible form the chief conclusions arrived at by modern critics in regard to the Pentateuch and its position in Jewish history, together with the evidence upon which they rest. The reader is led on from one point in the argument to another with admirable skill and clearness; nothing essential is omitted, while at the same time the whole chain of reasoning may be followed without difficulty by those who do not know a Hebrew letter and have never read a line of critical theology. Prof. Robertson Smith claims that there is no opposition between the results of critical inquiry and the fullest belief in the divine character of the Biblical record; on the contrary, these results, if frankly admitted, will be found to be confirmatory of the orthodox faith. Indeed the Professor's most relentless opponents ought to be gratified by the hard blows he deals at "rationalism," whatever that may mean.

With the theological aspect of the question we have of course nothing to do. But we must congratulate the Professor upon having found such large and sympathetic audiences to listen to an exposition of the mode in which the scientific principles of inductive inquiry have been applied to early history. The chief object of his contention is that the Levitical Law has taken its true place in the development of the Jewish nation; instead of coming at the beginning of the nation's existence, and so making the whole of its subsequent history unintelligible, it has been shown to have come at the end. Unknown to the most pious of the judges and kings, unknown equally to the prophets before the Exile, it naturally makes its appearance when Judah had ceased to be an independent state, when the free spontaneity of prophetic utterance was passing away, and when the priestly rulers of the returned exiles had no longer to fear the contamination of foreign idolatry or the erection of rival altars. The Levitical Law, according to Prof. Smith, follows the labours of the prophets; it does not precede them.

This result he claims to have obtained by questioning the Jewish records in accordance with the principles of scientific evidence. The credibility of a historical fact rests upon the authority of the documents or oral traditions that vouch for it, and naturally diminishes in proportion to the length of time between its supposed occurrence and the date of the earliest document in which it is described. The age and character, therefore, of a historical document must be closely tested and ascertained. The means for doing this are threefold: historical, literary, and philological. We must discover whether the historical conditions presupposed by the document agree with its assumed age, whether it bears marks of compilation and redaction, or has come to us straight from the hand of a single author, and whether the language in which it is written is as old as it professes to be. But when the age and character of the document have been thus determined, the scientific historian has still much to do. If its claims to antiquity can be substantiated we have still to ask whether the facts it narrates are the statements of a

contemporary, or only the far-off echoes of a bygone tale. If, on the other hand, its claims are disallowed, we have yet to discover how much or how little of its assertions may be believed; what rests on first-hand evidence, and what is merely late tradition or the coloured narrative of the writer himself. And even when all this has been done, our work is not quite over. The facts we have extracted from our authorities must be pieced together and shown to follow in a natural and continuous stream of development. For in history as in nature the scientific method reveals to us the law of continuity and development, and whatever offends against this law cannot be admitted in a scientific reconstruction of the past. The school of historians to which Prof. Robertson Smith belongs believe they have proved that the traditional view of the Pentateuch and the Levitical legislation does offend against this law, and they would change and modify it accordingly. And in thus changing and modifying it they claim the support of history, of literature, and of philology.

#### OUR BOOK SHELF

*Manuals of Elementary Science—Electricity.* By Prof. Fleeming Jenkin, F.R.S. (London: Society for Promoting Christian Knowledge, 1881.)

THIS little work, of little more than a hundred pages, is a remarkable *tour de force*, since it contains in briefest language almost everything that can be taught, without using mathematical symbols, of the modern notions on electricity. It therefore well deserves to stand as a companion volume beside that remarkable primer of "Matter and Motion" of the late Prof. Clerk-Maxwell. The strong point of the present elementary work on electricity is the way in which it points out the connection between electrical (and magnetic) phenomena and the phenomena of other branches of physics as regulated by the law of the Conservation of Energy. So early as the sixth paragraph the fundamental idea of electric potential is introduced, a course which is surely to be commended, inasmuch as there is no more inherent difficulty in the mind of the beginner in conceiving of electricity as able to do work by moving from one position to another than of conceiving it as able to exert a force at a distance, while there can be no question that the former of these two conceptions is the more fruitful for expressing electric actions and reactions. The inherent connection between induction and charge is carefully insisted upon, and the beginner is told in simple language how the equal and opposite stresses between the two elements of an induction-pair, separated by an insulating medium, represent a store of energy whose seat is in reality in the intervening medium. Where so much pains has been taken to spare the beginner from having anything to unlearn, it is a pity that in the very first sentence our antiquated friends the "two imponderable fluids called positive and negative electricity" crop up. We also think it is a mistake to refer to a magneto-electric generator as a magneto-electric "engine" (as is done on page 107). The chapter on Electro-chemistry is admirable in every way. The following paragraph, on the perception of electricity, deserves to be quoted entire:—

"Our atmosphere is not only electrified, but presents such variety in the intensity and distribution of its electrification, that a sense enabling us directly to perceive electricity would frequently disclose a scene as varied as a gorgeous sunset. This sense would reveal the surface of solid bodies delineated by varying electrical density. Dielectrics would be transparent to the new sense, and conductors would be opaque, having their projecting edges, corners, and points marked with startling distinct-

ness. The effect of contact in producing or maintaining difference of potentials would be perceived by a difference in electric brilliancy, and this difference would vary with each re-arrangement of the objects. Every movement of our body, each touch of our hand, and the very friction of our clothes, would cause a play of effects analogous to those of light and shadow on the eye, while more highly electrified matter would bring into prominence by induction electrical differences between surrounding bodies. This speculation, however fanciful, helps us to conceive the omnipresence of electricity; and since the mechanical conditions required to excite sensation are fulfilled in the electrical relations between bodies at different potentials, there does not seem any very great boldness in suggesting that some living things may have an *electrostatic sense* so far developed as to be of use to them" (page 51).

Altogether this little work forms a very suitable introduction to its author's much more advanced and well-known "Textbook of Electricity and Magnetism."

*The Natural History of the Cranes.* A Monograph by the late Edward Blyth. Greatly enlarged and reprinted with numerous illustrations by W. B. Tegetmeier. (Published for the Author, 1881.)

THIS is an excellent monograph of an exceedingly interesting group of birds. On the arrival in 1873 of a pair of the beautiful white-naped cranes of Japan in London they were drawn by Mr. T. W. Wood for the *Field* newspaper, and the late Edward Blyth took the opportunity of publishing in the columns of that paper a monograph of all the then known species of crane. At the suggestion of Prof. A. Newton, Mr. Tegetmeier has republished these notes, inserting however much new matter that either want of space had prevented Blyth from incorporating, or that had come to hand since Blyth's death. Thus we have Wolley's graphic account of the nesting of the common crane in Lapland, Dr. Cullen's account of the nesting of the Demoiselle in Bulgaria, and even Col. Przevalsky's account of a new species found at Koko-nor. Sixteen species, two belonging to the genus *Balearica* and fourteen to the genus *Grus*, are described. Mr. Wood's figures of *Grus leucauchen* are reproduced. There is a facsimile of the coloured figure of *Grus nigricollis* from Col. Przevalsky's "Birds of Mongolia"; a spirited sketch by Prof. W. H. Flower of flocks of *Grus virgo* on the banks of the Nile; some copies of studies of cranes from Mr. Cutler's beautifully-illustrated work on Japanese ornament (charming studies); and a few woodcuts of anatomical details.

Cranes of one or more species are found everywhere, with the exception of South America, the Malayan and Papuan Archipelagos, and the scattered islands of the Pacific. The common European species, celebrated in all times for its migrations—

"So steers the prudent crane  
Her annual voyage, borne on winds; the air  
Floats as they pass, fann'd with unnumber'd plumes"—

was at one time very numerous in the fenny districts of England; so possibly Milton knew the bird. The name is quite wrongly applied to the heron in Scotland and Ireland, while in America and Australia the white egret herons are also called cranes. Old Æsop's fable of the stork being captured in the evil companionship of the cranes, and being condemned to death for thus even associating with notorious plunderers of grain, indicates that he well enough knew the two kinds of birds; far better indeed, as Blyth truly remarks, than did that renowned master of mediæval painters, who commits the curious zoological mistake of introducing cranes instead of storks in his world-known cartoon of the Miraculous Draught of Fishes.

In common with many other gregarious birds, cranes always place sentinels as a lookout, while the rest of the

flock will trustfully repose; and they likewise leave them on the watch while on their marauding expeditions to crops of grain.

*Zoological Atlas (Including Comparative Anatomy)*

With practical directions and explanatory text for the use of students. 231 coloured figures and diagrams. By D. McAlpine. Vertebrata. (W. and A. K. Johnston, 1881.)

THE object of this work is to help the student in the examination and dissection of the leading types of animal life. The author quotes Dr. Macalister's words, "That in a practical science such as zoology it is only by the examination of specimens that any knowledge of the science worth acquiring can be obtained, and the function of a book is to assist in practical study." Bearing this in mind, he has here tried to assist the student by giving descriptions and drawings of one selected specimen from each group of the vertebrates. The skate and cod have been chosen to represent the cartilaginous and bony fishes respectively; the salamander to represent the tailed amphibia; the tortoise to represent the reptiles; and the pigeon and rabbit to represent the birds and mammals. The various systems are well represented, with the exception of the muscular system, which perhaps has been wisely overlooked. There can be no doubt but that this Atlas will form an important addition to the working student's books. It should remove many elementary difficulties from his path.

#### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

#### Dr. Carnelley's Experiment with Mercuric Chloride

I WAS a little surprised to notice from a paragraph in Prof. McLeod's letter in *NATURE*, vol. xxiv. p. 28, that he had been unable to repeat Dr. Carnelley's experiment with mercuric chloride. Immediately after the publication of my former letter, it was remarked to me, that although I had shown hot ice to be an impossible commodity, perhaps Dr. Carnelley's assertion of the existence of solid mercuric chloride above its boiling point might still hold. I therefore repeated this experiment, and after overcoming a few preliminary difficulties, obtained a result similar to that with ice. The difficulties were these:—After solidifying a cylinder of mercuric chloride round the thermometer (to which it adhered at first), on heating, the mercuric chloride soon became detached and fell from the thermometer. It had therefore to be sustained in position round the thermometer, by a stout iron or copper wire. Another difficulty arose from the fact that the mercuric chloride soon became deeply pitted and fissured, so much so, that the thermometer was sometimes seen through holes a quarter of an inch deep. This pitting went on till the mercuric chloride cylinder, though not much reduced in diameter, became a mere network, the thermometer being visible in many places. The erosion seemed to take place more quickly next the bulb; making the holes in the cylinder widest at the interior. Another difficulty lay in the high temperature causing, as Prof. McLeod noticed, the rupture of the thermometer thread; but by using a very good thermometer, and keeping it as nearly vertical as was convenient, this was entirely obviated. A large condenser is not required, and I only used a piece of combustion tubing fully an inch in diameter and about twenty inches long, the thermometer with the cylinder of mercuric chloride being inserted at one end, and a tube connected with a Sprengel pump at the other. The results obtained are as follows:—Melting point of mercuric chloride, 271° (uncorr.); boiling point, 291° (uncorr.). The pressure was now reduced to 400 mm., and the tube heated until the temperature was constant, the pressure again reduced, another reading taken, and so on until a vacuum was reached, or the cylinder had become too porous to give correct readings.